



# COVID-19 AND VACCINATION

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COVID-19 is the disease caused by the coronavirus SARS-CoV-2, a new virus first detected in December 2019 in the city of Wuhan, China.

In March 2020, the World Health Organization declared the outbreak of COVID-19 a global pandemic. In Quebec, in February 2021 we are in the second wave of this pandemic with more than 270,000 cases and more than 10,000 deaths.

To date, no medication is recommended to prevent or treat coronavirus infection. However, supportive treatments may be offered depending on the symptoms experienced and their severity. Although specific treatments are being studied and tested in clinical trials to assess their safety and efficacy, there is currently no evidence-based treatment available for COVID-19.

Vaccines for COVID-19 have been studied in clinical trials and approved for use against this disease. This raises the hope for a return to a life situation free from the adverse consequences of COVID-19.



## VARIANTS OF COVID-19

SARS-CoV-2, the virus that causes COVID-19, will naturally develop mutations, which are changes to the genetic material in the virus over time.

When there have been several significant mutations to the virus then it's called a "variant".

Genetic variants of viruses, such as the one that causes COVID-19, are common and expected.

Several variants of the virus that causes COVID-19 are circulating around the world:

The United Kingdom (UK) has identified a variant called B.1.1.7 with a large number of mutations in the fall of 2020. This variant spreads more easily and quickly than the other variants. In January 2021, British experts reported that this variant may be associated with an increased risk of death compared to other virus variants, but further studies are needed to confirm this finding. It has since been detected in many countries around the world, in the United States in late December 2020 and in Canada in January 2021.

In South Africa, another variant called B.1.351 was detected in early October 2020. Cases caused by this variant were reported in the United States at the end of January 2021.

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The two new variants of concern from the United Kingdom and South Africa include mutations that appear to make the virus more infectious, allowing it to spread more easily. However, they do not appear to affect the severity of the disease.

In Brazil, a variant called P.1 appeared and was first identified in four travellers from Brazil, who were tested during a routine screening at an airport in Japan in early January. This variant was first detected in the United States in late January 2021.

## MONITORING OF VARIANTS

The Public Health Agency of Canada works with provinces, territories and other partners to monitor and identify variants of concern in Canada, including the United Kingdom and South Africa variants. Monitoring for genetic changes in the virus allows us to better understand the potential impact of the mutations.

At this time, there's no evidence that some variants have an impact on drugs and the authorized vaccines efficacy. Pfizer and Moderna's vaccines appear to have some efficacy against these two variants. Research is underway to assess this efficacy.

Given the limited data on the new variants, more research is needed to confirm these early findings. The Canadian and global medical, public health and research communities are actively evaluating these variants and other significant mutations.



## TRANSMISSION

- ▶ The time period in which an individual with COVID-19 is infectious remains uncertain.
- ▶ An asymptomatic person is contagious.
- ▶ A person may be infectious for up to 3 days before showing symptoms (pre-symptomatic infectiousness).
- ▶ Viral RNA levels appear to be highest just before or soon after symptom onset.
- ▶ Humans can be re-infected with SARS-CoV-2.
- ▶ Currently, we do not know whether the presence of antibodies indicates immunity to re-infection, and if it does, how long that potential immunity lasts and what is the potential severity of subsequent infections.

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# VACCINATION AGAINST COVID-19

### CHRONOLOGY OF EVENTS AND DEVELOPMENT OF COVID-19 VACCINES

- ▶ On March 11, 2020, the World Health Organization (WHO) declares COVID-19 a pandemic.
  - ▶ Intensive research of vaccines and drugs.
  - ▶ International collaboration to develop and produce large quantities of vaccines, to be made available as quickly as possible.
  - ▶ First vaccine is available in December 2020.
  - ▶ Research program with 20 years of RNA-based technology, but first used and licensed for human vaccines.
  - ▶ Fast-track approval process for COVID-19.
  - ▶ Two vaccines authorized in Canada to date (Pfizer and Moderna).
  - ▶ The Government of Canada has signed advance purchase agreements for seven promising COVID-19 vaccines with the following companies: AstraZeneca; Johnson & Johnson; Medicago; Moderna; Novavax; Pfizer; Sanofi Pasteur/GlaxoSmithKline.
  - ▶ Most COVID-19 vaccines under development block the S protein, preventing the virus from entering and infecting human cells. These COVID-19 vaccines incorporate fragments of coronavirus that help induce an immune response in the body.
- ▶ Vaccines from more than one company will be used for vaccination against COVID-19 to vaccinate the population as soon as products are available and authorized by Health Canada.
  - ▶ Vaccination is free of charge and only reserved for people in priority groups.
  - ▶ Adults under 60 years of age who have a chronic disease such as scleroderma or a health condition that increases the risk of complications from COVID-19 will be vaccinated following those over 60 years of age. Next in line are adults under 60 years of age who do not have a chronic disease or health problem that increases the risk of complications, but who provide essential services and have contact with users; and then the rest of the adult population.
  - ▶ Following an agreement with Novavax, the production of their COVID-19 vaccine will take place in Quebec and should begin this year.

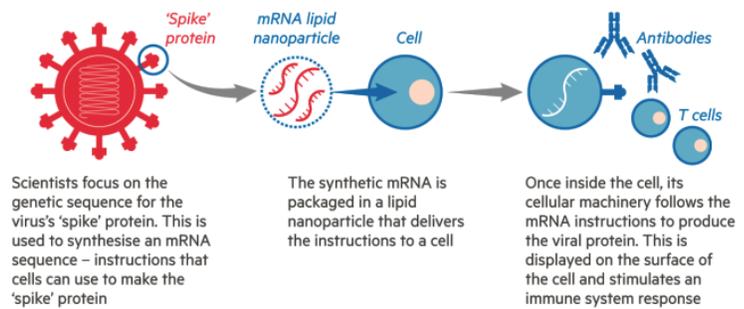


## COVID-19 AND VACCINATION

# PFIZER AND MODERNA VACCINES

### How the Pfizer-BioNTech vaccine works

mRNA vaccines give the immune system genetic instructions to recognise the virus



Source: Pfizer



These two COVID-19 messenger RNA (mRNA or messenger ribonucleic acid) inactivated vaccines have been in use in Quebec since mid-December 2020.

The messenger ribonucleic acid, messenger RNA or mRNA, is a highly purified transient copy of a portion of the DNA corresponding to one or more genes. mRNA is used as an intermediate by cells for protein synthesis.

### THE MESSENGER RNA OF THESE TWO VACCINES

- ▶ Provides cells with the genetic instructions for making the SARS-CoV-2 virus S protein (spike protein).
- ▶ Is surrounded by lipid particles allowing entry into host cells.
- ▶ The mRNA prompts the infected host cells to produce the S protein.
- ▶ The S protein, recognized as foreign, triggers the immune response.
- ▶ The mRNA and spike protein are then eliminated by the immune system.
- ▶ The efficacy of these vaccines is 92% 14 days after the first dose and 95% 7 days after the second dose.
- ▶ The duration of the protection is currently unknown.

## IMMUNOSUPPRESSED PATIENTS

Scleroderma patients are particularly vulnerable to COVID-19, especially if they suffer from pulmonary fibrosis or pulmonary arterial hypertension, or if they are taking corticosteroids or immunosuppressive drugs. These patients are commonly immunosuppressed and may have severe lung problems.

The Quebec Immunization Committee (QIC) considers that the benefits of vaccination outweigh the risks for immunocompromised individuals. However, the immune response triggered by the vaccine may be lower than in immunocompetent individuals.

The QIC considers that the benefits of vaccination outweigh the risks for patients with autoimmune diseases unless otherwise indicated by the treating physician.

Further research will provide more information for immunosuppressed or immunodeficient patients.

Strict adherence to the protective measures and recommendations of the Québec Ministry of Health can significantly reduce the risks of contagion. Let's hope that vaccination will contribute to a quick return to a life free from all these constraints.

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## REFERENCES

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  - [Related material: COVID-19 vaccine](#)
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